

BMP-5

BMP: SILT FENCE

Definition

A temporary sediment barrier consisting of a synthetic filter fabric stretched across and attached to supporting posts and entrenched.

Purposes

1. To intercept and detain small amounts of sediment from disturbed areas during construction operations in order to prevent sediment from leaving the site.
2. To decrease the velocity of sheet flows and low-to-moderate **level** channel flows.

Conditions Where Practice Applies

1. Below disturbed areas where erosion would occur in the form of sheet and rill erosion.
2. Where the size of the drainage area is no more than 0.3 hectares per 100 meters of silt fence length (0.25 acres per 100 feet); the maximum slope length behind the barrier is 30 meters (100 feet); and the maximum gradient behind the barrier is 50 percent (2:1).
3. In minor swales or ditch lines where the maximum contributing drainage area is no greater than 0.8 hectares (2 acres).
4. Under no circumstances should silt fences be constructed in live streams or in swales or ditch lines where flows are likely to exceed 0.03 cubic meters per second (1 cfs).
5. Silt fence will not be used in areas where rock or some other hard surface prevents the full and uniform depth anchoring of the barrier.

Planning Considerations

Research has shown that silt fences can trap a much higher percentage of suspended sediments than straw bales, though silt fences pass the sediment-laden water slower. Silt fences are preferable to straw barriers in many cases because of their durability and potential cost savings. While the failure rate of silt fences is lower than that of straw barriers, many instances have been observed where silt fences are improperly installed, inviting failure and sediment loss. The installation methods outlined here can improve performance and reduce failures.

As noted, flow rate through silt fence is significantly lower than the flow rate for straw bale barriers. This creates more ponding and hence more time for sediment to fall out.

Both woven and non-woven synthetic fabrics are commercially available. The woven fabrics generally display higher strength than the non-woven fabrics and, in most cases, do not require any additional reinforcement. When tested under acid and alkaline water conditions, most of the woven fabrics increase in strength, while the reactions of non-woven fabrics to these conditions are variable. The same is true of testing under extensive ultraviolet radiation. Permeability rates vary regardless of fabric type. While all of the fabrics demonstrate very high filtering efficiencies for sandy sediments, there is considerable variation among both woven and non-woven fabrics when filtering the finer silt and clay particles.

Design Criteria

1. No formal design is required. As with straw bale barriers, an effort should be made to locate silt fence at least 1.5 to 2 meters (5 to 7 feet) beyond the base of disturbed slopes with grades greater than 7%.
2. The use of silt fences, because they have such a low permeability, is limited to situations in which only sheet or overland flows are expected and where concentrated flows originate from drainage areas of 0.4 hectares (1 acres) or less.
3. Field experience has demonstrated that, in many instances, silt fence is installed too short, less than 0.4 meters (16 inches) above ground elevation. The short fence is subject to breaching during even small storm events and will require maintenance "clean outs" more often. Properly supported silt fence which stands 0.6 to 0.8 meters (24 to 34 inches) above the existing grade tends to promote more effective sediment control.

Construction Specifications

Materials

1. Synthetic filter fabric shall be a pervious sheet of propylene, nylon, polyester or ethylene yarn and shall be certified by the manufacturer or supplier.
2. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of -18° C to 50° C (0° F to 120° F).
3. If wooden stakes are utilized for silt fence construction, they must have a diameter of 50 millimeters (2 inches) when oak is used and 100 millimeters (4 inches) when pine is used. Wooden stakes must have a minimum length of 1.5 meters (5 feet).
4. If steel posts (standard "U" or "T" section) are utilized for silt fence construction, they must have a minimum weight of 2 kilograms per meter (1.33 pounds per linear foot) and shall have a minimum length of 1.5 meters (5 feet).
5. Wire fence reinforcement for silt fences using standard-strength filter cloth shall be a minimum of 14 gauge and shall have a maximum mesh spacing of 150 millimeters (6 inches).

Installation

1. The height of a silt fence shall be a minimum of 400 millimeters (16 inches) above the original ground surface and shall not exceed 865 millimeters (34 inches) above ground elevation.
2. The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter cloth shall be spliced together only at a support post, with a minimum 150 millimeter (6-inch) overlap, and securely sealed.
3. A trench shall be excavated approximately 100 millimeters (4-inches) wide and 100 millimeters (4-inches) deep on the upslope side of the proposed location of the measure.
4. When wire support is used, standard-strength filter cloth may be used. Posts for this type of installation shall be placed a maximum of 3 meters (10-feet apart). The wire mesh fence must be fastened securely to the upslope side

of the posts using heavy duty wire staples at least 25 millimeters long (1 inch), tie wires or hog rings. The wire shall extend into the trench a minimum of 50 millimeters (2 inches) and shall not extend more than 865 millimeters (34 inches) above the original ground surface. The standard-strength fabric shall be stapled or wired to the wire fence, and 200 millimeters (8 inches) of the fabric shall be extended into the trench. The fabric shall not be stapled to existing trees.

5. When wire support is not used, extra-strength filter cloth shall be used. Posts for this type of fabric shall be placed a maximum of 2 meters (6-feet) apart. The filter fabric shall be fastened securely to the upslope side of the posts using one 25 millimeter (1 inch) long (minimum) heavy-duty wire staples or tie wires and 200 millimeters (8 inches) of the fabric shall be extended into the trench. The fabric shall not be stapled to existing trees. This method of installation has been found to be more commonplace than #4.
6. If a silt fence is to be constructed across a ditch line or swale, the measure must be of sufficient length to eliminate endflow, and the plan configuration shall resemble an arc or horseshoe with the ends oriented upslope. Extra-strength filter fabric shall be used for this application with a maximum 1 meter (3-foot) spacing of posts.

All other installation requirements noted in #5 apply.

7. The 100 millimeter by 100 millimeter (4-inch by 4-inch) trench shall be backfilled and the soil compacted over the filter fabric.
8. Silt fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.

Maintenance

1. Silt fences shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.
2. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting.
3. Should the fabric on a silt fence decompose or become ineffective prior to the end of the expected usable life and the barrier still be necessary, the fabric shall be replaced promptly.

4. Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.
5. Any sediment deposits remaining in place after the silt fence is no longer required shall be dressed to conform with the existing grade, prepared and seeded.